Project Number 4

Nekton Use of the Marsh Surface: A Comparison Between Channelized and Natural Marshes

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Figures

ABSTRACT

The objectives of Year 2 were to compare densities of nekton (1) on marshes adjacent to canals and natural marshes and (2) within canals and tidal creeks. Flume nets were employed to sample nekton on marshes adjacent to canals and tidal creeks approximately twice-monthly between June 1990 and May 1991. A small hand trawl was used to sample nekton in canals and tidal creeks during the same period. Preliminary analyses of data collected through April 1991 showed that grass shrimp, cyprinodonts, blue crabs, and penaeid shrimp dominated catches on marshes adjacent to both habitats; and densities of nekton (all species combined) on marshes adjacent to canals were not significantly different from those collected on natural marshes ($p>0.5$). Greatest densities were observed within a pipeline canal between January and April 1991. Preliminary results suggest that canals and tidal creeks support comparable densities of nekton. However, the quality of the two habitats in terms of nursery function has not been compared Experiments planned for Year 3 will be used to address this issue.

PROJECT GOALS AND OBJECTIVES

The overall project objective is to evaluate the effects of wetland modification associated with channelization on living resources. Specifically, the study will determine if and how channelization affects the coupling of nekton between marshes and tidal creeks, what effect channelization has on the nursery value of marshes, and how might adverse effects be mitigated. The goals of the second year were to compare densities of nekton (1) on marshes adjacent to pipeline canals and natural tidal creeks using flume nets and (2) within canals and tidal creeks with a hand trawl.

ACCOMPLISHMENTS TO DATE

Trawl and flume samples were collected from June 1990 and sampling will continue through May 1991. Trawl sampling has been completed, and the last flume samples will be collected on May 30, 1991. All but the May samples have been processed, and data were transferred to computer files for rapid analysis. I anticipate that processing of samples for Year 1 and data entry will be completed by early June 1991, and final data analysis will begin at that time. Data collected through April 1991 were analyzed to include in this annual report. However, the results of these analyses are preliminary and are subject to modification after a thorough analysis of the entire database.

SIGNIFICANT FINDINGS

Grass shrimp, cyprinodonts, blue crabs, and penaeid shrimp dominated catches on marshes adjacent to both habitats (natural tidal creeks and pipeline canals); and densities of nekton (all species combined) on marshes adjacent to canals were not significantly different from those collected on natural marshes ($p>0.5$). However, the trend was one of higher catches adjacent to pipeline canals than on natural marshes (Figures 1 and 2). Densities of nekton within natural channels and canals were also comparable, although greatest densities were found in a pipeline canal sampled between January and April 1991 (Figure 3).

At least two hypotheses can be constructed to explain these results. Perhaps most nekton species of Gulf Coast marshes use only the marsh edge (i.e., tidal creek/marsh interface) as habitat. If this is so, then fringing marshes along canals may provide habitat comparable in quality to that found along the edge of natural tidal creeks especially if slumping reduces the steepness of canal banks allowing this area to be used as refugia and foraging areas at low

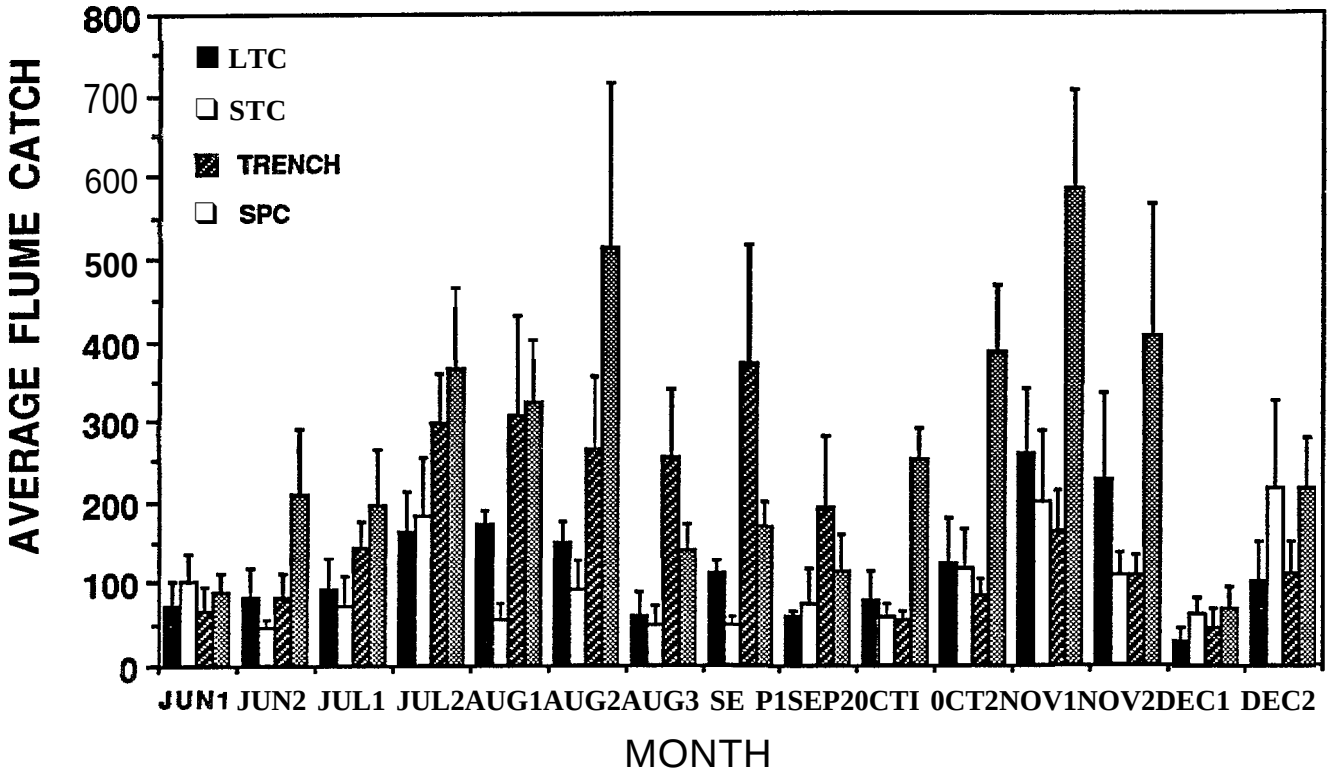

Figure 1. Average catch (all species combined) collected in flumes between June and December 1990 on marshes adjacent to tidal creeks (LTC and STC), a pipeline trench (TRENCH), and a pipeline canal (SPC).

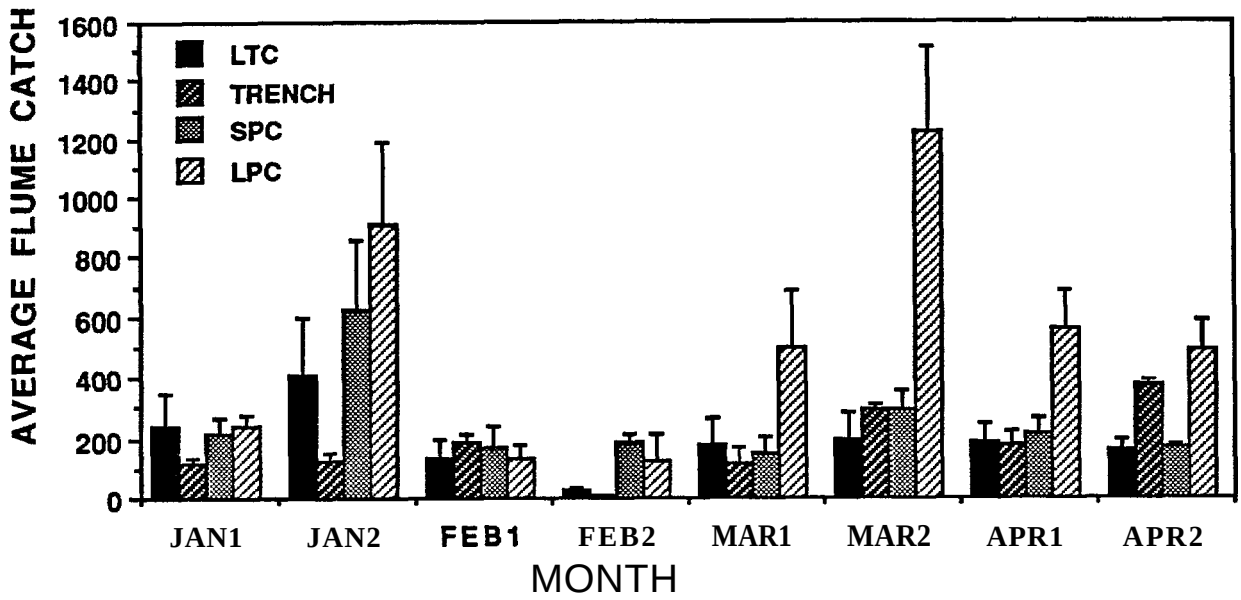

Figure 2. Average catch (all species combined) collected in flumes between January and April 1991 on marshes adjacent to a tidal creek (LTC), a pipeline trench (TRENCH), and pipeline canals (SPC and LPC).

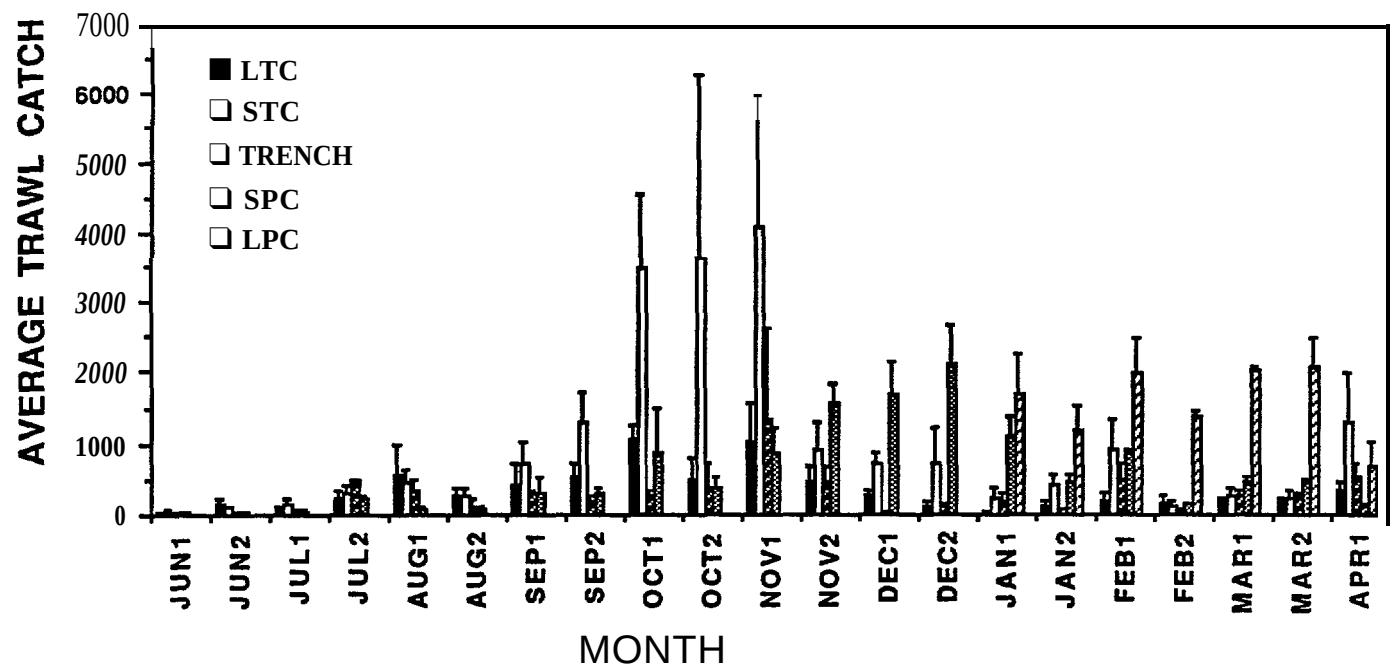

Figure 3. Average catch (all species combined) collected with a trawl between June 1990 and April 1991 in tidal creeks (LTC and STC), a pipeline trench (TRENCH), and pipeline canals (SPC and LPC).

tide. Alternatively, densities of nekton observed within and adjacent to natural creeks may appear low relative to those found within and along canals, because tidal creeks are more complex geomorphic features than canals. Natural marsh drainages are often a complex network of primary, secondary, and tertiary creeks, whereas canals are relatively simple features separated from most other water bodies by spoil levees. Given a canal and tidal creek of equal length, aquatic organisms in the canal have a smaller area over which to disperse except on extremely low tides when tidal creek tributaries are completely drained and inaccessible to nekton. Therefore, except during periods of very low tides, nekton may be more concentrated in canals or on marshes adjacent to canals than in tidal creeks or on marshes contiguous with creeks.

PROBLEMS OR DELAYS ENCOUNTERED AND PROPOSED SOLUTIONS

No major problems were encountered during Year 2.

REVISED SCHEDULE FOR REMAINDER OF PROJECT

I do not anticipate a need to revise the project schedule. The major objectives of Year 3 are to test Hypotheses 4 and 5, i.e. compare the habitat function of canals and natural tidal creeks relative to predation pressure and prey availability. Although the results of Year 2 suggest that canals and tidal creeks support similar densities of nekton, the nursery value of these two habitats may not be equal. For example, higher rates of predation in one of the habitats could be masked by higher rates of recruitment. Tethering experiments will be used to compare relative predation pressure in the two habitats. Predator abundance will be determined in canals and tidal creeks by seining the two habitats. Furthermore, the availability and quality of food in the two habitats maybe different. For example, large areas of marsh are unavailable to organisms residing in canals because of spoil banks. If nekton require large areas of marsh for foraging, their growth in canals could be reduced. The availability of prey in the two habitats will be compared by enclosing several dominant species in small cages in each habitat, allowing them to feed for several hours, and examining their stomach contents.

PROJECT PARTICIPANTS

Donald F. Boesch has taken a position as Director of the CEES program in Maryland; therefore, he is no longer involved in the project. A total of four individuals are participating in this research, one PI (Lawrence P. Rozas) and three research assistants (Marvin Goodly, Mark Jackson, and Scott Longman).

RELATED PUBLICATIONS AND PRESENTATIONS

An abstract titled "Nekton use of the marsh surface: a comparison of channelized and natural marshes" has been submitted for presentation at the eleventh biennial meeting of the Estuarine Research Federation to be held November 10-14, 1991 in San Francisco, California.

PROPOSALS SUBMITTED AND GRANTS RESULTING

1. "Potential for Enhancement of Fisheries Habitat by Infilling OCS Pipeline Canals," June 1990,3 years, Minerals Management Service, funded.

2. "A Field Evaluation of the Environmental Impacts of Spray Dredging: An Alternative Technology for Accessing Drilling Sites in Coastal Wetlands," September 1991,3 years, Department of Energy, pending.